DOCUMENT RESUME

ED 024 260 EM 000 258

Specification for Teaching Machines and Programmes (Interchangeability of Programmes). Part 1. Linear Machines and Programmes.

British Standards Institution, London (England).
Report No-BS-4226 1967
Pub Date 67
Note-14p.
EDRS Price MF-$0.25 HC-$0.80
Descriptors-*Equipment Standards, Linear Programing, Programed Instruction, *Specifications, *Teaching Machines
Identifiers-*England

To promote interchangeability of teaching machines and programs, so that the user is not so limited in his choice of programs, the British Standards Institute has offered a standard. Part I of the standard deals with linear teaching machines and programs that make use of the roll or sheet methods of presentation. Requirements cover: spools, program movement, masks, program width, layout, size, leader and trailer, thickness of program material, sheet capacity, order of stacking after use, clearance, and marking. (MF)

EDO 24260

BRITISH STANDARD 4226 : 1967
UDC 681.39:371.694

SPECIFICATION FOR TEACHING MACHINES AND PROGRAMMES (INTERCHANGEABILITY OF PROGRAMMES)

Part 1.
Linear machines and programmes

METRIC UNITS

BRITISH STANDARDS INSTITUTION

SPECIFICATION FOR

TEACHING MACHINES AND PROGRAMMES

(INTERCHANGEABILITY OF PROGRAMMES)

Part 1. Linear machines and programmes

BS 4226 : 1967

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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EM 000 258

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THIS BRITISH STANDARD was published under the authority of the General Council on 20th November, 1967.

The Institution desires to call attention to the fact that this British Standard does not purport to include all the necessary provisions of a contract.

In order to keep abreast of progress in the industries concerned, British Standards are subject to periodical review. Suggestions for improvements will be recorded and in due course brought to the notice of the committees charged with the revision of the standards to which they refer.

A complete list of British Standards, numbering over 4000, fully indexed and with a note of the contents of each, will be found in the British Standards Yearbook, price 15s. The BS Yearbook may be consulted in many public libraries and similar institutions.

British Standards are revised, when necessary, by the issue either of amendment slips or of revised editions. It is important that users of British Standards should ascertain that they are in possession of the latest amendments or editions.

The following BSI references relate to the work on this standard:
Committee reference M/91 Draft for comment 66/19068

CO-OPERATING ORGANIZATIONS

The following Government Departments and educational and industrial organizations were directly represented on the committee responsible for the preparation of this British Standard:

Association of Education Committees
Association of Programmed Learning
Association of Supervising Electrical Engineers
British Association for Commercial and Industrial Education
Committee of Vice-Chancellors and Principals of the Universities of the United Kingdom
Department of Education and Science
Educational Equipment Association
Educational Foundation for Visual Aids
Electronic Engineering Association
Ministry of Defence, Navy Department
Ministry of Technology
Publishers' Association
Scientific Instrument Manufacturers' Association
Scottish Education Department
Manufacturers and educational and management consultants.

BRITISH STANDARD SPECIFICATION FOR

TEACHING MACHINES AND PROGRAMMES (INTERCHANGEABILITY OF PROGRAMMES)

Part 1. Linear machines and programmes

FOREWORD

Developments in the field of programmed instruction have resulted in the production of a wide range of teaching machines for the presentation of information to the student, and it has been found that in general each particular machine is capable of presenting only those programmes especially designed for that machine.

Teaching machines and programmes are relatively expensive and can represent a considerable capital outlay on the part of user organizations. The range of programmes associated with a particular machine is often narrow, both in respect of choice of subject and of topics within a specified subject, thus the user able to buy only one or two types of machine is limited in his choice of programmes. Further, should the type of machine he possesses go out of production, he could eventually find that new and replacement programmes were no longer available.

This British Standard is intended to help overcome these difficulties by specifying certain essential features of each of the main types of machine and programme, so that programmes made to comply with this standard can be presented on roll or sheet machines (as appropriate), made to comply with this standard.

Part 1 of the standard deals with linear teaching machines and programmes that make use of the roll or sheet methods of presentation. Part 2, which is in course of preparation, will deal with branching teaching machines and programmes.

SPECIFICATION

1. GENERAL

1.1 SCOPE

This Part of the British Standard specifies requirements for those features of linear teaching machines and programmes employing roll or sheet methods of presentation affecting the interchangeability of programmes between machines.

1.2 DEFINITIONS

For the purposes of this British Standard the following definitions apply:

(1) *Frame*. A limited space allowed for the presentation of teaching material; also the teaching material contained in this space.
(2) *Answer box*. The space where the answer presented by the programme is displayed.
(3) *Mask*. The covering designed to restrict the amount of programme displayed.

2. ROLL METHOD OF PRESENTATION

2.1 REQUIREMENTS FOR MACHINES

2.1.1 Spools

2.1.1.1 Machines shall be provided with a spool to the design and dimensions given in Fig. 1, and shall be designed to take this spool in both the supplying and taking up positions.

2.1.1.2 The core of the spool shall be slotted through its axis and the slot designed and constructed in such a way as to permit ease of threading and to obviate the possibility of the leading point of the programme catching inside the spool. Means of securing the end of the programme alternative to that shown in Fig. 1 are permissible provided that they are equally effective.

2.1.1.3 Teaching machines shall be designed to require not more than 400 mm length of leader and of trailer to secure programmes in position.

2.1.1.4 The supply spool shall be capable of rotating in both directions to permit the programme to feed either over or underneath the spool.

2.1.2 Programme movement. Machines shall be so designed that programme frames succeed one another in an upward direction, i.e. away from the student, and provision shall be made for rewinding.

2.1.3 Masks

2.1.3.1 Basic masks shall be designed to display a frame (but not its corresponding answer box), together with the immediately preceding frame and its answer box.

2.1.3.2 Basic masks shall be dimensioned to display frames of height 45 mm.

2.1.3.3 Masks shall also be available to display frame heights of 90 mm and 135 mm for programmes using these size frames throughout, or in a separately identifiable part of the programme.

2.1.4 Clearance. Machines shall be designed with a minimum clearance of 0·25 mm to allow programmes freedom of movement which might otherwise be limited by the thickness of the programme material.

2.2 REQUIREMENTS FOR PROGRAMMES

2.2.1 Spools. Programmes shall be provided on spools conforming to the dimensions given in Fig. 1.

2.2.2 Programme width. Programmes shall be printed on material of A4 paper width (210 ± 2 mm).

2.2.3 Programme layout

2.2.3.1 Programmes shall be printed with each answer box horizontally aligned with its corresponding frame in accordance with the layout illustrated in Fig. 2.

2.2.3.2 If the same programme is printed on both sides of the programme roll this shall be done in such a way that the first frame of the programme on one side is immediately opposite the last frame on the other side to avoid re-winding.

2.2.3.3 If different programmes are printed on each side, the first frame on one side shall be immediately opposite the first frame on the other side.

2.2.3.4 The basic height of frames shall be 45 mm, but where required the height may be increased to 90 mm or to 135 mm. One frame height only shall be used in a particular programme or in a separately identifiable section of the programme.

2.2.4 Leader and trailer

2.2.4.1 Programmes shall be preceded by not less than 500 mm length of leader and followed by not less than 500 mm of trailer.

2.2.4.2 The ends of the leader and trailer shall be cut as illustrated in Fig. 1.

2.2.5 Thickness of programme material. Programmes shall be printed on material of thickness not more than 0·15 mm and when wound on a spool the programme shall be contained within the diameter of the flanges of the spool.

3. SHEET METHOD OF PRESENTATION

3.1 REQUIREMENTS FOR MACHINES

3.1.1 Sheet capacity. Machines shall be designed to take sheets of the size given in 3.2.1 when made up into a pack having a thickness of 6 mm.

3.1.2 Programme movement. Machines shall be so designed that programmes are fed in an upward direction away from the student or in a downward direction towards the student.

3.1.3 Masks

3.1.3.1 Basic masks shall be designed to display a frame (but not its corresponding answer box), together with the immediately preceding frame and its answer box.

3.1.3.2 Basic masks shall be dimensioned to display frames of height 45 mm.

3.1.3.3 Masks shall also be available to display frame heights of 90 mm and 135 mm for programmes using these size frames throughout, or in a separately identifiable part of the programme.

3.1.4 Clearance. Machines shall be designed with a minimum clearance of 0·25 mm to allow programmes freedom of movement which might otherwise be limited by the thickness of the programme material.

3.1.5 Order of stacking after use. Machines shall be designed in such a way that packs of sheets are restacked so that they may be used again without sorting.

3.2 REQUIREMENTS FOR PROGRAMMES

3.2.1 Programme size. Programmes shall be printed on material of A4 paper size, 210 ± 2 mm in width by 297 ± 2 mm in height.

3.2.2 Programme layout

3.2.2.1 Programmes shall be printed with each answer box horizontally aligned with its corresponding frame, in accordance with the layout illustrated in Fig. 2.

3.2.2.2 The same programme shall be printed on both sides of each sheet, but in opposite directions as shown in Fig. 3 to allow for presentation in machines with either upward or downward programme movement.

3.2.2.3 The basic height of frame shall be 45 mm but where required the height of frame may be increased to 90 mm or to 135 mm. One frame height only shall be used in a particular programme or in a separately identifiable section of the programme.

3.2.3 Thickness of programme material

3.2.3.1 Programmes shall be printed on material of thickness not more than 0·15 mm.

3.2.3.2 The total thickness of the pack of sheets shall not exceed 6 mm.

3.2.4 Clearance at top and bottom of sheets. Any perforations and sheet identification marks shall be contained within top and bottom margins, each 13 mm wide, which shall otherwise be left blank.

3.2.5 Identification of sheet sides. To facilitate sorting, the corner of each sheet shall be cut off to a diagonal depth of 10 mm as illustrated in Fig. 3.

4. MARKING

4.1 MARKING

4.1.1 Machines. Each teaching machine complying with this British Standard shall be marked with the following:

(1) The name of the manufacturer.
(2) The number of this British Standard, i.e. BS 4226.

4.1.2 Programmes. Each programme complying with this British Standard shall be marked with the following:

(1) The name of the publisher.
(2) The number of this British Standard, i.e. BS 4226.

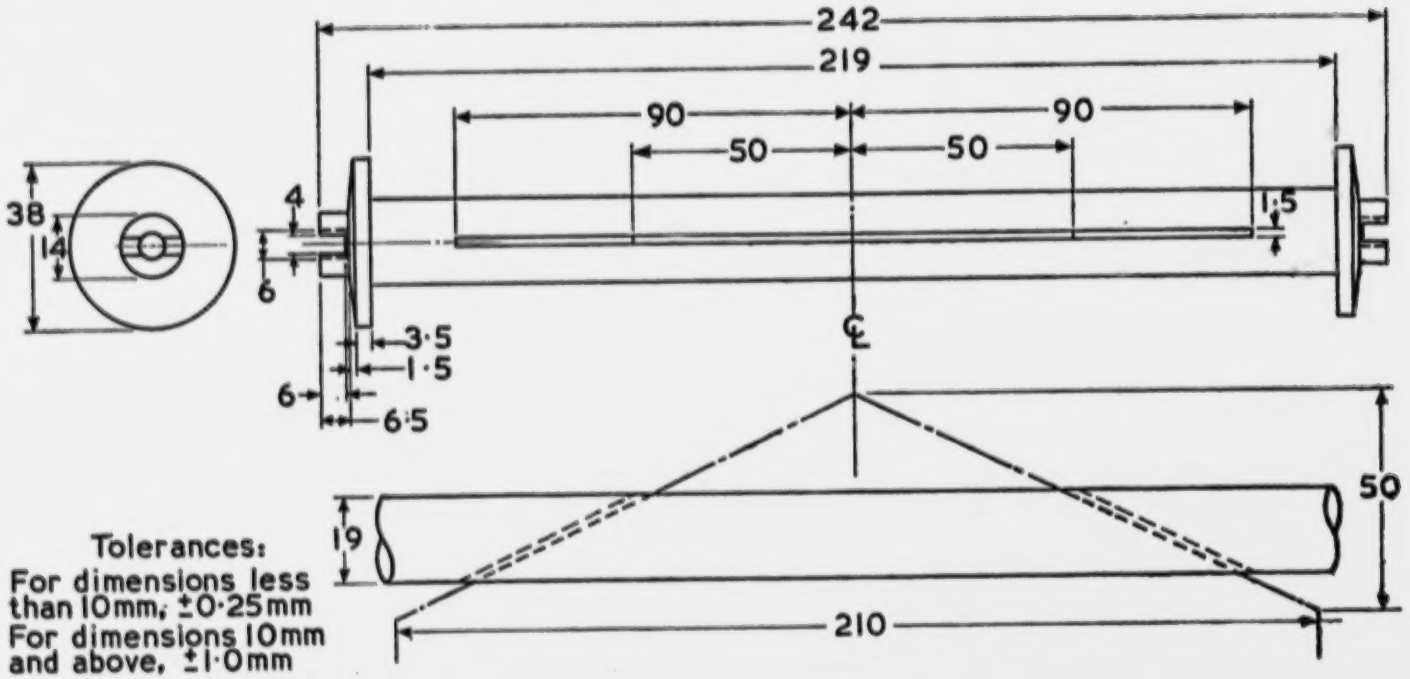

Fig. 1. Spool for linear teaching machine showing shape of ends of programme roll
All dimensions in millimetres.

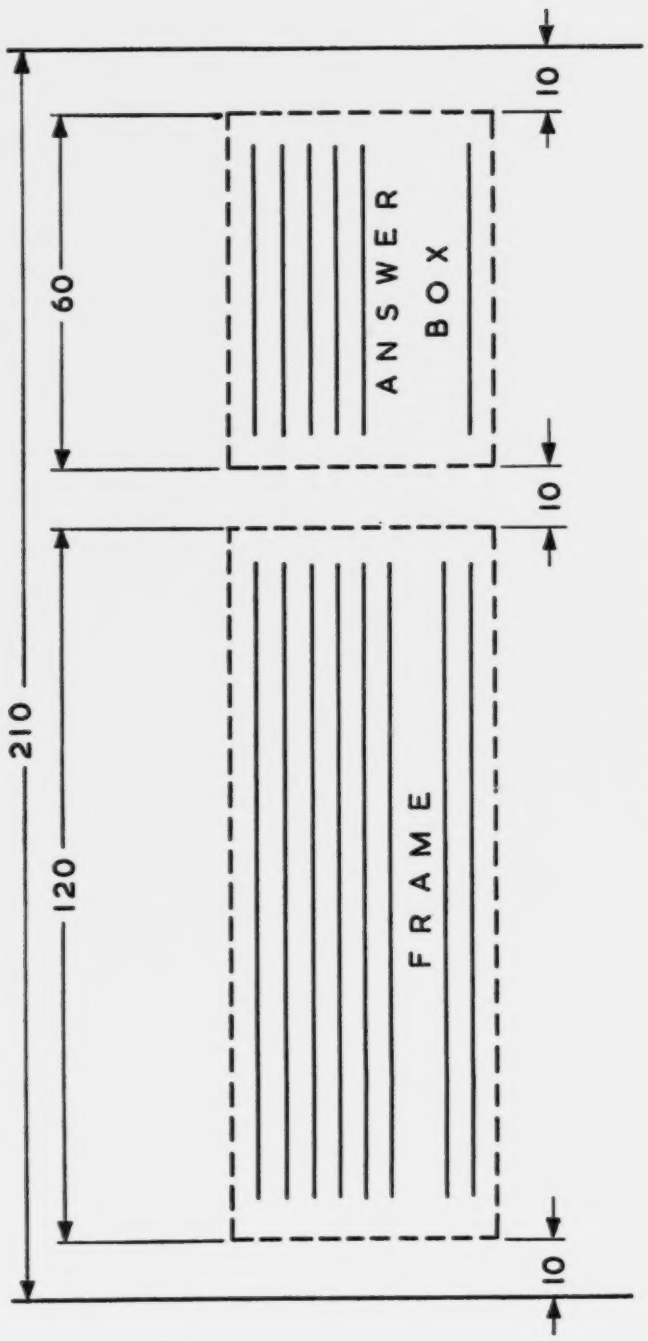

Fig. 2. Layout of programme
All dimensions in millimetres.

Corner cut away →

31. During the man's cycle which lasts *** the man works for one minute and is idle for two minutes. — three minutes

The machine works for two minutes and is idle for *** during each of its cycles. — one minute

32. If we can cut down on the time spent idle by man or machine, we can make the cutting process more efficient and (more/less) expensive. — less

33. In each of its cycles the machine stands idle for one minute. But this minute is spent in loading. So the machine must stand idle for ..... in each of its cycles. — one minute

34. How about the man?

He loads the machine in one minute, and then is idle for two minutes. During the two minutes he (does/does not) do useful work. — does not

35. Let us see whether the man could work another hacksaw, as well as the one he is already operating.

As soon as he has loaded hacksaw 1, he can start loading hacksaw 2. — one minute

This will take him an extra ***.

36. As the man had two minutes to spare after loading hacksaw 1, and as loading hacksaw 2, takes only one minute, it looks as if the man (will/will not) be able to look after two hacksaws. — will

Fig. 3a. Example of sheet programme layout. Side 1 (upward movement)

Fig. 3b. Example of sheet programme layout. Slide 2 (downward movement)

36. As the man had two minutes to spare after loading hacksaw 1, and as loading hacksaw 2, takes only one minute, it looks as if the man (will/will not) be able to look after hacksaws. will

35. Let us see whether the man could work another hacksaw, as well as the one he is already operating.

As soon as he has loaded hacksaw 1, he can start loading hacksaw 2. one minute

This will take him an extra ***

34. How about the man?

He loads the machine in one minute, and then is idle for two minutes. During the two minutes he (does/does not) do useful work. does not

33. In each of its cycles the machine stands idle for one minute. But this minute is spent loading. So the machine must stand idle for ..... in each of its cycles. one minute

32. If we can cut down on the time spent idle by man or machine, we can make the cutting process more efficient and (more/less) expensive. less

31. During the man's cycle which lasts *** the man works for one minute and is idle for two minutes. three minutes

The machine works for two minutes and is idle for *** during each of its cycles. one minute

Corner → cut away

SHEET NO. 7

BRITISH STANDARDS INSTITUTION

The British Standards Institution was founded in 1901 and incorporated by Royal Charter in 1929.

The principal objects of the Institution as set out in the charter are to co-ordinate the efforts of producers and users for the improvement, standardization and simplification of engineering and industrial materials; to simplify production and distribution; to eliminate the waste of time and material involved in the production of an unnecessary variety of patterns and sizes of articles for one and the same purpose; to set up standards of quality and dimensions, and to promote the general adoption of British Standards.

In carrying out its work the Institution endeavours to ensure adequate representation of all viewpoints. Before embarking on any project it must be satisfied that there is a strong body of opinion in favour of proceeding and that there is a recognized need to be met.

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Printed in England by Gaylard & Son Ltd, London, S.E.14